IN THE UNITED STATES PATENT AND TRADEMARK OFFICE



In re patent application of

Sinan BALCI et al.

Corres. to PCT/EP2005/001025

For: METAL SIDE-PLATE FOR A RADIATOR

VERIFICATION OF TRANSLATION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Elisabeth Ann LUCAS,

Director of RWS Group Ltd, of Europa House, Marsham Way, Gerrards Cross, Buckinghamshire, England declare:

That the translator responsible for the attached translation is familiar with both the German and the English language, and that, to the best of RWS Group Ltd knowledge and belief, the attached English translation of International Application No. PCT/EP2005/001025 is a true, faithful and exact translation of the corresponding German language paper.

I further declare that all the statements made in this declaration of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful, false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful, false statements may jeopardize the validity of legal decisions of any nature based on them.

July 18, 2006

Date

Name: Elisabeth Ann LUCAS
Director
For and on behalf of RWS Group Ltd

# Metal side-plate for a radiator

The present invention relates to a metal side-plate for radiators, in particular for tubular radiators such as those which find an application in vehicles with internal combustion engines.

Radiators of this kind exhibit a radiator body, in which tubes extend in the longitudinal direction, in conjunction with which heat exchanger surfaces are embodied between the tubes. What is more, the radiator is enclosed by at least one pair of metal side-plates situated to either side of the radiator body. The metal side-plates in this case extend along or across the direction in which the tubes of the tubular radiator extend. They delimit in particular the heat exchanger surfaces, are utilized for the purposes of assembly, for example, and also prevent the ingress of undesired contamination into the area between the heat exchanger surfaces and in so doing prevent impairment of the heat exchange performance of the heat exchanger.

The length of the tubes and the heat exchanger surfaces changes in the presence of fluctuations in the operating temperature of the tubular radiator, so that a loading due to thermal stress can make its effect felt on the metal side-plate.

The object of the invention is to make available a metal side-plate that is executed in such a way that stresses arising from various kinds of thermal expansion of the metal side-plate and tubular radiator are prevented. This object is achieved by a metal side-plate in accordance with the independent claim.

A metal side-plate of this kind, which can find an application in particular for tubular radiators, is intended to be used in radiator bodies in which tubes

extend in the longitudinal direction and in which heat exchanger surfaces are arranged between the tubes, in conjunction with which the metal side-plates are intended to close off the radiator on at least one pair of opposing sides. What is more, the metal side-plates are characterized in that they exhibit a weakened area, in conjunction with which the material of the metal side-plate in this area is weakened in such a way as to allow compensation for the thermal expansion corresponding to that of the radiator body.

This weakening of the material enables the thermal expansion of the metal side-plate to be adapted to that of the radiator body and thereby permits the permanent retention of the metal side-plate on both sides of the radiator body. The occurrence of stresses, both in the metal side-plate and in the radiator body, due to different thermal expansion is avoided at the same time.

According to a preferred embodiment of the invention, the weakening of a weakened area is effected by penetrations in the material of the metal side-plate. It is particularly advantageous if the penetrations are embodied in such a way that a network of webs is formed. The adoption of this measure ensures that high mechanical flexibility of the lateral part is achieved, which is able to compensate for thermal expansion deviating from the thermal expansion of the radiator body. It is especially favorable if the penetrations are executed in such a way that the network of webs forms lozenges standing on their tips in the longitudinal extent of the metal side-plate, that is to say in the longitudinal direction. In this way, the webs which delimit the penetrations in each case run with a directional component in the longitudinal direction of the metal side-plate, in

which the different thermal expansion produces its effect, and also at all times in a directional component transversely thereto, so that a certain rigidity and dimensional stability of the metal side-plate nevertheless continue to be assured. An alternative embodiment is provided if the network of webs delimits honeycomb-shaped penetrations. What is more, the honeycomb-shaped penetrations can be formed both by penetrations having a hexagonal form and by penetrations having an octagonal form. Hexagonal, honeycomb-shaped penetrations have the advantage that they are able to form a closed surface, whereas in the case of octagonal honeycombs, lozenge-shaped intermediate surfaces occur repeatedly, with the result that a uniform, transcurrent pattern is not produced. What is more, octagonal honeycombs repeatedly form areas of material running in the longitudinal direction and in the transverse direction of the metal side-plate, whereas hexagonal honeycombs only exhibit areas of material running either in the longitudinal direction or in the transverse direction of the metal side-plate. It is accordingly possible in this case for a different longitudinal rigidity to result in relation to the transverse rigidity of the metal side-plate.

According to embodiments of the invention, a weakened area is produced in the form of a plurality of rows of penetrations, in conjunction with which the rows of penetrations are preferably arranged off-set in relation to one another, and the number of rows can be selected in such a way that, when viewed in the direction in which the metal side-plate extends, the length of the penetrations added together at each point transversely to the direction of its extent amounts to at least 1.5 times, and preferably at least two to three times, the maximum length of a penetration in the direction of its extent. The adoption of this measure

ensures that a certain length of material is free over the entire width of the metal side-plate when viewed in the longitudinal direction, so that a specific, defined minimum weakening of the longitudinal rigidity of the insert plate is achieved over its entire width.

According to a preferred embodiment of the insert plate, this is bent in its cross section, at least in the area of weakening, and is preferably of a u-shaped embodiment. Such a design of the cross section, including in the area of weakening, increases the connecting rigidity of the insert plate and guarantees dimensional stability.

Moreover, the invention is explained in greater detail below with reference to the illustrative embodiment depicted in the drawing. In the drawing:

Figure 1 depicts a radiator that is delimited on its mutually opposing sides by an insert plate in accordance with the invention;

Figure 2 depicts an insert plate in accordance with the invention;

Figure 3 depicts an insert plate in accordance with the invention with a weakened area as an enlarged representation.

Figure 1 depicts a radiator 10, in which tubes extending in the longitudinal direction of the radiator are surrounded by heat exchanger surfaces 11. Two mutually opposing sides of the radiator are delimited by metal side-plates 12, which are securely retained to other components connected to the radiator and are also aligned in the longitudinal direction. What is more, each of the metal side-plates 12 exhibits two weakened

areas 13, each of which, in particular in the final one third, and preferably in the final one quarter of the metal side-plate, are executed all the way to the edge.

Figure 2 depicts an oblique representation of such a metal side-plate 12 having two weakened areas 13, in conjunction with which each of the weakened areas 13 is formed by penetrations 14 in the material of the metal side-plate.

Figure 3 depicts an enlarged representation of such a weakened area 13. It can be appreciated in this case that the penetrations are executed adjacent to one another in such a way that a network of webs 15 is produced between them. In the embodiment represented here, the webs 15 are executed in such a way that they delimit lozenge-shaped penetrations in each case. What is more, the penetrations 14 are arranged in a plurality of rows 16. Four rows of penetrations 14, which form the weakened area 13, are executed one after the other in the illustrative embodiment represented here. What is more, the rows are offset in relation to one another in such a way that a material-free section is produced over the entire width of the metal side-plate 12, the overall length of which is greater than twice the maximum length of a penetration in the direction in which it extends. The use of a lozenge-shaped form for the penetrations ensures that a compact, contiguous arrangement of the penetrations can be achieved over the entire surface. A constant width of the webs 15 between two penetrations is maintained throughout, so that the rigidity of the metal side-plate is capable of being determined accurately in the area of the penetration.

As can also be appreciated from Figures 2 and 3, the metal side-plate 12 is of u-shaped execution in

its cross section, in conjunction with which the cross-sectional form is also maintained in the weakened area 13. It is ensured by this means that a corresponding weakening of the material is also provided in this peripheral area and, at the same time, that a basic measure of torsional rigidity and dimensional stability of the metal side-plate is also assured in the weakened area 13.